

REMARKS

Reconsideration is requested.

Claims 1 and 2 are pending

The Section 103 rejection of claims 1 and 2 over Bailey (U.S. Patent No. 5,959,187) in view of Town (GenBank Accession NM 111887, January 10, 2002), is traversed. Reconsideration and withdrawal of the rejection are requested in view of the following distinguishing comments.

Bailey et al teaches a method of making transgenic plants expressing a haemoglobin gene from the bacteria *Vitreoscilla*. Bailey et al suggests that the method could be practiced with any globin. Town et al (GenBank NM_111887) discloses a class II haemoglobin from plant origin.

Several lines of evidence in the prior art, such as are described below, suggested that plant haemoglobins, in particular non-symbiont haemoglobins, to which class II haemoglobins of the current application belong, are not suitable to practice the method of Bailey et al.

1 – Not all globins are suitable to practice the method of Bailey et al.

A haemoglobin of human origin which is a globin protein was expressed in the plant tobacco without having any physiological effect (Dyerick (1997) Nature Mar 6; 386 (6620):29-30). However, when the haemoglobin of *Vitreoscilla* was used in tobacco plants, physiology of growth and photosynthesis were altered. The person ordinarily skilled in the art would have recognized that choosing the origin of the haemoglobins is of crucial importance to practice the invention of Bailey et al.

In view of the above and Bailey et al, the ordinarily skilled person in the art setting out to modify the plant characteristic of claims 1 and 2 of the current application would know that not all globins are suitable to practice the method of Bailey et al. Furthermore, the teaching of Bailey in view of Dyerick (1997) would have led the ordinarily skilled person in the art setting out to practice the method of Bailey to have used a globin protein from a bacterial origin, preferably from *Vitreoscilla*. The ordinarily skilled person in the art would not have used a haemoglobin of eukaryotic origin, not even if haemoglobins of plant origin (such as that disclosed in GenBank NM_111887) were known.

The presently claimed invention would not have been obvious.

2 – Class II Haemoglobins of plant origin have different biochemical function than *Vitreoscilla* haemoglobin (VHb) Combination of cited documents Bailey et al. and NM_111887 would not have made the claimed invention obvious.

Bailey and colleagues, in the scientific publication "Bulow et al (1999) TIBTECH 17, 21-24" further teach that the biochemical properties of the bacteria *Vitreoscilla* (used as examples to explain the method of the cited Bailey patent) are very different from those non symbiont haemoglobins of plant origin (See Table 1 of Bulow et al (1999) TIBTECH 17, 21-24). While the *Vitreoscilla* haemoglobin has a low affinity for oxygen which allows rapid release of oxygen (page 22, column 2, lines 19-29, Bulow et al, TIBTECH 1999), the plant haemoglobins have a very high oxygen affinity and low dissociation constant which allow for tight binding to oxygen. These biochemical

properties make of Vitreoscilla haemoglobin an efficient protein to transport oxygen while the plant proteins are inefficient as oxygen transporters.

In the same document Bullock et al (1999) the authors hypothesized that the kinetic properties of VHb underlie the effects of the invention of Bailey et al, U.S. Patent No. 5,959,187 (effect of VHb in transgenic plants):

"Although the mechanism behind the effects of VHb in heterologous hosts are not yet fully characterized, it has been suggested that VHb facilitates oxygen transport and/or storage. This hypothesis is supported by the kinetic properties of VHb, which allow very rapid dissociation of oxygen from the protein".

Furthermore, in the same document Bullock et al, 1999 the following is stated:

"As naturally occurring plant haemoglobins have higher oxygen affinities than Vitreoscilla haemoglobin, it is not likely that they have similar functions" (page 24, column 1, lines 19-21).

In view of the above a person of ordinary skill in the art would not have made the claimed invention from the cited art with any reasonable expectation of success.

Withdrawal of the Section 103 rejection is requested.

The claims are submitted to be in condition for allowance and a Notice to that effect is requested. The Examiner is requested to contact the undersigned, preferably by telephone, in the event anything further is required.

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Respectfully submitted,

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